ENGINEERING REPORT

FOR

EXTENSION OF WATER DISTRICT #13

TO SERVE

MEADOWBROOK ESTATES

NYS ROUTE 94

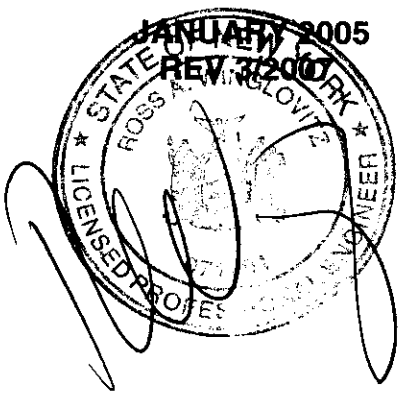
TOWN OF NEW WINDSOR
ORANGE COUNTY, NEW YORK

PREPARED BY

EP
Engineering Properties, PC
110 Orange Avenue
Walden, NY 12586

JANUARY 2005
REV. 3/2007

W.O. 104.01



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APPENDIX

1.0 INTRODUCTION

The Meadowbrook Estates is a proposed 90 unit single family development on New York State Route 94 in the Town of New Windsor and the Town of Cornwall. It is proposed that water is to be provided to the project through an extension of the Town of New Windsor Water District #13. This district is located north of and east of the project site.

According to town records, the Town of New Windsor water system is serviced by raw water from the Catskill Aqueduct. The total water treatment capacity is 3.5 MGD, 3.0 MGD from the Riley Road Plant and 0.5 MGD from the Stewart Field Plant. This finished water then enters the distribution system which contains 4.68 MGD of finished water storage capacity. This capacity is provided in two 1 million gallon water storage tanks within the system, a 2.5 million gallon treated water storage reservoir at Stewart Airport and an additional storage of 180,000 GPD at the Riley Road water treatment plant. In review of the towns most recent records the system has an average daily demand of 2.9 MGD and a maximum daily demand of 4.0 MGD. In addition to this capacity the Town also has an interconnection with the City of Newburgh and the Town of Newburgh. Each of these connections has a permissible emergency taking of 500,000 GPD for a total additional emergency capacity of 1.0 MGD. Based on the information provided by the Town there is a total available capacity of 3.5 MGD with an average usage of 2.9 MGD and an excess capacity of almost 0.6 MGD.

Hydrant testing in the vicinity of the site has been performed. Based on these test (see Appendix C) normal operating pressure was 75 psi at the test hydrant with an adjacent ground elevation 366 feet. Flow test at this hydrant (see location map Appendix B) yielded a fire flow of 1,205 gallons per minute at 55 psi residual. The flow and pressure has been analyzed at the highest point of the site and most remote point of the site (See Appendix C).

2.0 SITE DESCRIPTION

The project site currently includes parcels in both the Town of New Windsor and Town of Cornwall totaling 164.2 acres. The 136 acres in the Town of New Windsor are identified as Section 65 Block 1 Lot 61.1 and 61.2 and Section 65 Block 1 Lot 78. The portions of the two parcels totaling 28.2 acres in the Town of Cornwall are identified as Section 4 Block 1 Lots 9.22 & 11. Before water district No. 13 is extended to include the Cornwall portion of the property, the said portion will be annexed into the Town of New Windsor. The project site is located south and west of Mt. Airy Road, north of N.Y.S. Route 94 and east of Bethlehem Road. The site is 6,500 feet west of the 'Five Corners' (intersection of N.Y.S. Route 94 and 32). The site is bordered to the west by vacant land and to the north by the "Reserve" residential subdivision. Elevations of the developed portion of the site range from 350 feet along Callington Way to a high of 480 feet along Meadowbrook Road. Road grades immediately above the water line range from 456.5 feet to 356.5 feet. Currently, the existing Water District #13 boundary abuts the site to the north and west. The water district would be extended to include the parcels within the project. It has been indicated that there is an existing 12" water main located in the right-of-way of Dean Hill Road, which is located approximately 1,600 feet from the northeast corner of the site. This main has been tested and contains adequate flow and pressure to services the proposed district extension. Appendix A illustrates the current district boundary and the proposed water district extension.

3.0 PROPOSED WATER FACILITIES

The proposed water main design will consist of a looped water main designed to service the 90 proposed residential units. The proposed project will require an average daily demand of 27,000 gallons per day (assuming 4 residents per unit at 75 gallons per day per resident). The maximum daily demand is projected to be 54,000 gallons per day or 2 times the average day. The peak hour demand is calculated to be 75 gallons per minute or 4 times the average daily demand

A total of 12,450 feet of new 8" diameter and 800 feet of 10" diameter class 54 cement lined ductile iron pipe will be installed. The proposed water system will begin at a connection to the existing 12" water main at the intersection of Mount Airy Road and Dean Hill Road. From this point the new water line will go down Dean Hill Road to the sewer pump station entrance, and then continue through the park to the site where it will interconnect with the town park system. All new mains shall have hydrants and valves spaced as needed and will be designed and constructed in accordance with the requirements of the Town of New Windsor and NYSDOH specifications.

Refer to Appendix B for a conceptual plan of the proposed water district extension improvements. All improvements will be constructed within the Town of New Windsor road right-of-way, otherwise water easements will be granted to the Town of New Windsor.

4.0 COST OF IMPROVEMENTS

The estimated construction cost of the water system improvements is $772,750. The costs for the proposed improvements will be borne by the developer. There would not be any additional costs to district users for the proposed district extension. Refer to Appendix D for the construction cost estimate.

Finally, the developer would be responsible for the water permit, which is $250/residence, the meter and remote which are $255/residence and the ditch and final inspection fee of $50/residence. Assuming 90 units the developer would be accountable for $49,950.

5.0 WATER FEES

Since all improvement costs are the responsibility of the developer, the only fees that will be assessed to the typical residence are debt service and user fees. In accordance with the Town of New Windsor's 2006 tax schedule, residents in Water District #13 will be charged a debt service of $12.0622 per $1000 of their

assessed property value each year. Residents are also charged a usage fee each quarter of **$3.1968** per 100 cubic feet of water consumed.

According to the Tax Assessor's office a typical $350,000 single-family home with an equalization rate of 13.74% would have an assessed value of approximately $51,780 per year. Therefore the typical residence would pay **$580.07** per year in debt service fees. Assuming the average home water usage would most likely be in the range of 300 gallons per day (gpd), based on 75 gpd per person. Consequently the water usage fee would be **$467.98** per year, bringing the total yearly cost for the typical residence to **$1,048.05.**

APPENDIX A

All that certain lot, piece and parcel of land situated in the Town of New Windsor, County of Orange, State of New York as shown on the 2006 Orange County tax maps as follows:

TOWN OF NEW WINDSOR-

SECTION 4 - 2/3/06	SECTION 66 - 8/24/04
SECTION 9 - 3/8/06	SECTION 77 - 11/6/03
SECTION 57 - 10/18/05	SECTION 95 - 3/22/06

TOWN OF CORNWAL-

SECTION 1 - 3/16/06	SECTION 4 - 3/22/06

Also based upon the Annexation Maps between the Town of New Windsor and Town of Cornwall filed on February 2, 2006 and recorded in Liber 12078 Pages 1794 and 1809 and being more accurately bounded and described as follows:

Beginning at a point along the westerly boundary of lot 95-1-3.2 of Town of New Windsor Assessment Maps said point also being the southeasterly corner of lot 95-1-11 of the Town of New Windsor Assessment Maps; thence north following the westerly line of lot 95-1-3.2 approximately 1,260 to the southerly line of the former New York, Ontario and Western railroad right of way; thence in a westerly direction along the southerly line of the former right of way a.k.a lot 95-1-4.2 to the south west corner of lot 95-1-4.2; thence north along the common line of lots 95-1-4.2 and 57-1-8.3 a distance of approximately 100 feet to the northerly side of said former right of way and north westerly corner of lot 95-1-4.2; thence east along the northerly boundary of lots 95-1-4.2 to its intersection with the westerly boundary of lot 95-1-3.2; thence north along the westerly boundary of lot 95-1-3.2approximately 90 feet to the northeast corner of lot 9-1-5; thence in a westerly direction along the northerly boundary of lot 9-1-5 to the southeast corner of lot 57-1-28; thence north along the easterly lot line of lot 57-1-28 to the northwesterly corner of lot 95-1-3.2; thence east along the northerly line of lot 95-1-3.2 and the current Water District 8 boundary to the southeasterly corner of lot 64-2-38; thence continuing along the Water District 8 boundary south along

the westerly line of lots 77-11-6,7,8,9,10 to the southwesterly corner of lot 77-11-6; thence continuing along the Water District 8 boundary west along southerly line of lots 77-11-1 thru 5, 77-10 lots 1-5 and 77-9-6 to the southeast corner of lot 77-9-6; thence continuing along the Water district 8 boundary east along the southerly line of the town park and the northerly line of lots 95-1-3.2 approximately 310 feet to a common corner, thence continuing along the Water district 8 boundary south along the same common boundary approximately 640 feet to a common corner, thence continuing along the Water district 8 boundary east along the same common boundary approximately 1,230 feet to the northwest corner of lot 66-1-1; thence leaving the Water district 8 boundary and continuing south along the westerly line of lot 66-1-1,2,3 and 4 to a point being the common corner of lots 95-1-3.2, 66-1-4 and 66-1-5; thence in a southeasterly direction along the northeast line of lot 66-1-5 to its intersection with the westerly side of Mount Airy Road right of way and the Water District 13 boundary; thence continuing along the Water District 13 boundary for approximately 25 feet south along the westerly side of Mount Airy Road right of way; thence leaving the Water District 13 boundary and continuing south along the westerly side of the Mount Airy Road right of way to the southeast corner of lot 66-1-5; thence west along the southerly line of lot 66-1-5 to the northwest corner of lot 66-1-8; thence south along the westerly line of lot 66-1-8 to the southeast corner of lot 95-1-3.2; thence west long the common boundary between lot 95-1-3.2 and Town of Cornwall tax lot 4-1-9.21 to the easterly most corner of lot 95-1-12; thence northwest to the northerly most corner of lot 95-1-12; thence southwest along the northwesterly line of lot 95-1-12; to the easterly right of way of the former New York, Ontario and Western railroad right of way a.k.a. 95-1-4.2; thence southeast along the easterly side of railroad right of way to a point which is the common corner of lots 95-1-4.2, 95-1-12, and Town of Cornwall tax lot 4-1-9.21; thence west along the common line of lots 95-1-4.2 and Town of Cornwall tax lot 4-1-11 a distance of approximately 70 feet to the boundary of tax lot 95-1-3.2; thence south along the westerly side of Town of Cornwall tax lot 4-1-11 approximately 190 feet to the common corner of tax lot 95-1-3.2 and Town of Cornwall tax lots

4-1-11 and 4-1-10.1; thence running along the common boundary of tax lots 95-1-3.2 and Town of Cornwall tax lot 4-1-10.1 the following

1- southwesterly approximately 325 feet to a point, thence
2- southeasterly approximately 195 feet to a point, thence
3- southwesterly approximately 273 feet to a point, thence
4- southeasterly approximately 416 feet to a point, thence
5- northeasterly approximately 225 feet to a point, thence
6- on a curve to the right with a radius of 150 feet 215 to a point, thence
7- southeasterly approximately 230 feet to a point

along the north side of the Old Route 94 right of way and southwesterly corner of lot 4-1-10.1; thence southwest along the northerly boundary of the Old Route 94 right of way a distance of approximately 106 feet to its intersection with the northwest corner of Town of Cornwall tax lot 4-1-8.1; thence west along the southerly boundary of lot 95-1-3.2 a distance of approximately 900 feet to the northwest corner of Town of Cornwall tax lot 4-1-7.21; thence in a northerly direction along the westerly boundary of lot 95-1-3.2 to the northeast corner of lot 4-1-35; thence west along the northerly line of Town of Cornwall Tax lot 4-1-35,34 and 33 to the southwest corner of lot 95-1-3.2; thence north along the westerly line of lot 95-1-3.2 to the northwest corner of Town of Cornwall tax lot 1-1-118 the point and place of beginning. Including in its entirety lots 95-1-3.2, 95-1-4.2, and 66-1-5.

APPENDIX B

APPENDIX C

FIRE FLOW TEST DATA SHEET

TEST LOCATION: Mt. Airy Rd / Dean Hill Rd

TEST OBSERVER: F.L. Malloy Fire Inspector

TIME: 10:45

DATE: 9/19/2002

Approx Elev. 367.0

OBSERVED TEST DATA:

STATIC PRES. (PSI) 75

RESID. PRESS (PSI) 55

PITOT PRES (PSI) GPM-1205 (52)

FLOW TABLES (C=.9) ---

HYDR. NOZZLE COEFF. ---

HYDR. NO. B-158

BUTT NO. N/A

FLOW OPN'G(INS) 1-5 1/2, 2- 2 1/2

REMARKS:

ENGINEERING PROPERTIES, P.C.	HYDRAULICS WORKSHEET		
110 Orange Avenue Walden, NY 12586	WO. NO. 104.01	DATE 9/19/2006	SHEET 1 OF 2
PROJECT TITLE MEADOWBROOK ESTATES		LOCATION MT AIRY ROAD, NEW WINDSOR	
CALCULATED BY RW	APPROVED BY JS	REF DRAWING(S)	

Fire Flow Test Data

Fire Flow data from test performed @ Dean Hill & Mt. Airy Road

P_{static}=	70	lb/in^2	Q =	1200	gallons/min
$P_{residual}$=	49	lb/in^2	d=	12	inch dia.
el.=	381.3	ft			

Existing Water System Data

Determine friction head loss for existing system @ 1200 gpm:

$h_f = (p_1-p_2)/\gamma$

p1=	70	lb/in^2 or	10080	lb/ft^2
p2=	49	lb/in^2 or	7056	lb/ft^2
γ=	62.4	lb/ft^3		
hf =	48.5	ft		

Determine equivalent length of 12" ductile iron water main:

$hf = 10.44\ (L,ft)\ (Q,gpm)^{1.85}/(C^{1.85})(d,in)^{4.8655}$

Equiv. L=	Solve for	
Q=	1200	gpm
C=	110	Hazen-Williams Constant for 10 year old DIP
d=	12.0	in
hf=	48.5	ft

$L = hf/(10.44\ (Q,gpm)^{1.85}/(C^{1.85})(d,in)^{4.8655})$

Equiv. L= 9944 ft

Existing Water System with Proposed Water main Extensions

Conservation of Energy Equation:

$$Z_1 + p_1/\gamma + V_1^2/2g = Z_2 + p2/\gamma + V_2^2/2g + hf$$

Left Side of Equation: (water surface in storage tank)

Z1=	540.25	ft -elev. water in storage tank
p1=	0	psi
γ=	62.4	lb/ft^3
V_1^2=	0	ft/s

Simplifying:

$$540.25 + 0 + 0 = 456.75 + 20(144)/62.4 + V_2^2/64.4 + hf$$

Rearranging:

$$37.30 = V_2^2/64.4 + hf$$

Right Side of Equation: (Highest proposed Hydrant)

Z_2=	456.75	ft - elevation of proposed hydrant
p_2=	20	psi - min. required pressure in system.
γ=	62.4	lb/ft^3
V_2^2=	Solve for	
g=	32.2	ft/sec^2

$hf = 10.44\ (L,ft)\ ((Q,gpm)^{1.85}/(C^{1.85})(d,in)^{4.8655}))$

$V_{8"line} = ((Q,gpm)/(60(7.48))/0.35$

At the highest point in the system with a residual pressure of 20 psi there is 37.3 feet of head loss available, when the reservoir is at its lowest level.
(See below for the flow that creates 37.3 feet of head loss in the system at the discharge point)

ENGINEERING PROPERTIES, P.C.		WATER HEAD LOSS WORKSHEET	
110 Orange Avenue Walden, NY 12586	WO. NO. 104.01	DATE 9/19/2006	SHEET 2 OF 2
PROJECT TITLE MEADOWBROOK ESTATES, MT AIRY ROAD		LOCATION TOWN OF NEW WINDSOR	
CALCULATED BY RW	APPROVED BY JS	REF DRAWING(S)	

Solution to Conservation of Energy Equation:

Flow (Q, gpm)= **769.0** (required fire flow) + (average daily demand)

Velocity (V,ft/s, 8")= 4.9

Velocity Head loss = $V_2^2/64.4$ = 0.4

See Below for Tabulation of hf through each leg of distribution network:

$hf = 10.44(L)(Q)^{1.85}/(140)^{1.85}(d)^{4.8655}$

HEAD LOSS CALCULATIONS

Dist. Section	L0	L1	L2	L3	L4	L5	L6	
Pipe Size, in	12.0	8.0	8.0	10.0	8.0	10.0	10.0	
Length, ft	9944.0	2300.0	1734.0	605.0	1440.0	875.0	215.0	
%Flow	100.0%	46.3%	53.8%	100.0%	30.0%	70.0%	100.0%	
hf, ft =	21.3	5.4	5.4	2.0	1.5	1.5	0.7	Σhf =

Dist. Section	L7	L8
Pipe Size, in	8.0	8.0
Length, ft	2010.0	2497.0
%Flow	53.0%	47.0%
hf, ft =	6.1	6.1

$V_2^2/64.4$
8.0
-
100.0%
0.4

TOTAL HEAD LOSS= 21.3 + 5.4 + 2 + 1.5 + 0.7 + 6.1 + 0.4 = 37.4 FT > 37.3 FEET ALLOWABLE

Based on this calculation, during fire flow conditions the pressure will drop neglibilbe below 20 psi to 19.96 psi at the highest point of the site for approximately 25 ft. of the several thousand feet of new main.

APPENDIX D

EP	**Engineering Properties, P.C.** **110 Orange Avenue Walden, NY 12586**	**COST ESTIMATE WORK SHEET**
		DATE 9/7/2006
		SHEET 1 OF 1

PROJECT TITLE	LOCATION
Meadowbrook Estates	Town of New Windsor
ESTIMATED BY	REF DRAWING(S)
jpc	

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	ESTIMATED COST
	8" DIP water main	12450	LF	$50.00	$622,500.00
	10" DIP water main in Mt. Airy Road	800	LF	$100.00	$80,000.00
	Contingency 10%				$70,250.00
	TOTAL ESTIMATED COST				**$772,750.00**

PROPOSED EXTENSION #1 TO WATER DISTRICT 13

WD-8

WD-13

TOWN OF NEW WINDSOR

TOWN OF CORNWALL

NOTE:
1) PLAN BASED ON 2006 TAX MAP DATA AS FOLLOWS:
TOWN OF NEW WINDSOR-
SECTION 4 - 2/3/06 SECTION 66 - 8/24/04
SECTION 9 - 3/8/06 SECTION 77 - 11/6/03
SECTION 57 - 10/18/05 SECTION 95 - 3/22/06
TOWN OF CORNWAL-
SECTION 1 - 3/16/06 SECTION 4 - 3/22/06
2) PLAN ALSO BASED ON TOWN OF NEW WINDSOR ANNEXATION MAPS FILED ON FEBRUARY 2, 2006 AND RECORDED IN LIBER 12078 PAGES 1794 AND 1809

ED ENGINEERING PROPERTIES, PC
110 ORANGE AVE.
WALDEN, NY 12586
Ph: (845) 778-4313
Fx: (845) 778-4669

JOB# 104.01
SHEET# WD-1
DATE: JAN '05
REV. MARCH '07
SCALE: 1" = 400'

MEADOWBROOK ESTATES
N.Y.S. ROUTE 94
TOWN OF NEW WINDSOR
ORANGE COUNTY, NEW YORK

PROPOSED EXTENSION #1
TO WATER DISTRICT #13

N

L = 459'

L = 2397'

MT. AIRY ESTATES

HIGHEST DISTRIBUTION POINT
ELEVATION = 457.0

L = 2588'

MEADOWBROOK
ESTATES

SECTION L3
(CRITICAL LEG OF LOOP)
PROPOSED 8" WATERLINE
LENGTH = 1802'

SECTION L4
PROPOSED 10" WATERLINE
LENGTH = 215'

SECTION L5
(CRITICAL LEG OF LOOP)
PROPOSED 8" WATERLINE
LENGTH = 1668'

L = 1742'

DISTRIBUTION SECTION L2
PROPOSED 10" WATERLINE
LENGTH = 595'

ROUTE 94

TOWN OF CORNWALL

TOWN OF NEW WINDSOR

L=1685'

MEADOWBROOK
LODGE

NEW WINDSOR
SPORTS COMPLEX

SECTION L1
(CRITICAL LEG OF LOOP)
PROPOSED 8" WATERLINE
LENGTH = 1670'

MT. AIRY ROAD

EXISTING 12" WATER MAIN

FIRE FLOW TEST LOCATION
STATIC PRESSURE = 75 PSI
DYNAMIC PRESSURE = 55 PSI
FLOW = 1205 GPM
HYDRANT ELEVATION = 367.0

N.Y.S. ROUTE 94

MT. AIRY ROAD

EP ENGINEERING PROPERTIES, PC
110 ORANGE AVE.
WALDEN, NY 12586
Ph: (845) 778-4313
Fx: (845) 778-4669

DATE: OCT '05
JOB # 104.01
SCALE: 1" = 400'
SHEET # W-1

MEADOWBROOK ESTATES
NYS ROUTE 94
TOWN OF NEW WINDSOR
ORANGE COUNTY, NEW YORK

OVERALL WATER SYSTEM PLAN